

# ANEXA 1

## CURRICULUM

Valid for the study cycle 2024-2027

"Aurel Vlaicu" University of Arad

### Faculty of Exact Sciences

Department: **Mathematics and Computer Science**

Name of program: **Mathematics and Computer Science**

Field of studies: **Mathematics**

Length of program / number of ECTS credits: **3 years /180 credits**

Type of education: **Full – Time study**

Graduate title earned: **Bachelor in mathematics**

### 1. MISSION STATEMENT

The teaching and research mission of the master study programme in question fits the profile and speciality of the Faculty of Exact Sciences. It consists in training high qualified professionals in the fields of mathematics and computer science competitive in the work market.

### 2. OBJECTIVES

- Maintaining a high level of scientific training to be transferred to the students in the Mathematics & Computer Science, compatible with the EU standards and the possibility for them to opt for certain study routes in order to rapidly be integrated into the professional activity;
- Promoting a modern and flexible curriculum, according to european values of a society based on knowledge, favoring the interdisciplinarity and the methodologies of teaching, learning and evaluating, depending on the shape and dynamics of the field;
- Achieving a true quality of the teaching-learning process by making use of some continuously evolving didactical strategies;
- Training professionals with solid theoretical and practical knowledge in accordance to the european standards;
- Stimulating the interest to continue the professional training and scientific research in order to efficiently to the requirements of a knowledge-oriented society.

### 3. SPECIFIC EDUCATIONAL OBJECTIVES (COMPETENCES TO BE ACQUIRED)

#### ESCO Competences

- C1. Develops problem-solving strategies
- C2. Performs analytical mathematical calculations
- C3. Synthesizes information
- C4. Thinks abstractly
- C5. Communicates mathematical information
- C6. Applies scientific methods
- C7. Uses data processing techniques
- C8. Uses software for specialized design
- C9. Manages personal professional development
- C10. Carries out research activities at an interdisciplinary level
- C11. Process data
- C12. Gives proof of disciplinary expertise
- C13. Teach mathematics
- C14. Develop digital educational materials
- C15. Use mathematical and computer tools
- C16. Provides technical documentation
- C17. Use databases

#### Transversal competences

- TC1. Shows initiative

- TC2. Give advice to others
- TC3. Takes responsibility
- TC4. Works in teams
- TC5. Shows confidence
- TC6. Builds team spirit
- TC7. Plans

#### 4. ACADEMIC CAREER DEVELOPMENT

Bachelor's degree graduates "Mathematics and Computer Science" according to the Romanian Occupational Catalogue (COR – ISCO-08), can be hired in the following positions:

- 2120 – cod 212009 – mathematician
- 2120 – cod 212001 – mathematical consultant
- 2120 – cod 212014 – statistical analyst
- 2330 – cod 233002 – teacher in secondary education
- 2512 – cod 251202 – programmer
- 2521 – cod 252101 – database administrator

#### 5. FINAL STIPULATIONS

The Curriculum will be approved, according to the National Education Law 199/2023 by the university Senate and after being signed on each page the President of the Senate.

Approved Curriculum valid for study cycle 2024-2027.

#### 6. ANALYSIS OF THE CURRICULUM

- In Curriculum for Mathematics and Computer Science study program the taught disciplines are included with the following weights:

Nr. crt.	Subject Type	Hours /Study program _____		
		Hours	Ratio %	
			Study program	ARACIS regulations
1	Fundamentals (DF)	714	38,6%	35-45%
2	Specialty (DS)	840	45,5%	35-50%
3	Complementary (DC)	294	15,9%	10-20%
TOTAL		1848		-

- The total number of hours of this program is 1848, divided as follows:
  - Compulsory requirements ..... **1848 hours**
  - Internship.....**120 hours**
  - Internship to prepare the Bachelor Thesis..... **84 hours**

Total.....**1848 hours**

ARACIS regulations (1848 ÷ 2352 hours)

- Curriculum structure, according course types (compulsory and elective):

Course	Hours per curriculum	
	Hours	Ratio %
Compulsory courses	1484	80,3% (ARACIS regulations 70%-83%)
Elective courses	364	19,7% (ARACIS regulations 30%-17%)
TOTAL	1848	100%

- The ratio between lectures and practice (seminars, laboratories, projects, internship) is 1:1,16, complying with the ARACIS regulations 1:1+50%.
- **The ratio of the facultative disciplines** to the total number of hours 13,7%.
- Study program **Mathematics and Computer Science**, and Mathematical domain fit the national qualifications in HG 412/2024.
- The courses included in the Curriculum and the subjects studied are perfectly aligned with the Bachelor program (BSc) in Mathematics (HG 412/2024).

- The curriculum of the with the Bachelor program (BSc) program “**Mathematics and Computer Science**” complies with the European Credit Transfer and Accumulation System (ECTS) and with the Law 199/2023 on the organizing of university master studies.

## 7. TIME SKEDULLING OF THE ACADEMIC YEAR (WEEKS)

Year	Didactic activities (weeks)		Exams (weeks)			Internship	Holiday (weeks)			
	Sem. I	Sem. II	Winter session	Summer session	Retake session		Winter	Between semesters	Spring	Summer
Year I	14	14	3	3	2	-	2	1	1	12
Year II	14	14	3	3	2	4	2	1	1	8
Year III	14	14	3	2	1	84*	2	1	1	-

\*Distributed along the 14 weeks of Sem.II

Practice is organized according to firm rules stated in documents conceived by the Mathematics & Computer Science and approved by the Faculty Council. Practice activities can take place both at faculty’s laboratories and certain economic units (based on “practice conventions”).

## HOURS PER WEEK OF COMPULSORY AND ELECTIVE COURSES

Year	Semester I (hours / week)	Semester II (hours / week)	
I	22	22	
II	22	22	4 weeks – Internship (112-132 hours)
III	22	22	84 hours (14 weeks x 6 hours) - Internship to prepare the Bachelor Thesis

## 7. REQUIREMENTS FOR PASSING, PROMOTION AND COMEBACK

The requirements for passing (admission to the next academic year), promotion or comeback to studies are stated in the [RAPS Regulations](#).

## 8. THE BACHELOR THESIS

The requirements for preparing, submitting and defending the Master Thesis are stated in the [Regulation on the organization and conduct of bachelor/diploma and dissertation examinations](#).

- Communicating the subjects for the Bachelor Thesis: semester 4
- Preparing the Bachelor Thesis: the semesters 5 and 6
- Submitting and defending the Bachelor Thesis: July – 3<sup>rd</sup> year
- The final exam consists:
  - Testing the general and specialized knowledge – 5 credits
  - Defending the bachelor’s thesis – 5 credits

## 9. THE ECTS CREDITS ASSOCIATED WITH THE STUDY PROGRAM

- 72 ETC for fundamental disciplines
- 84 ETC for specialty disciplines
- 30 ETC for complementary disciplines
- Total 186 ETC**
- 149 ETC from compulsory courses (included 6 ETC for Sport)
- 37 ETC from elective courses
- 26 ETC supplementary for diploma

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**HEAD OF DEPARTMENT**  
Lect.univ.dr. Lorena Camelia POPA

**CURRICULUM**  
Academic year 2024-2025  
Year I

Code	Subject	Course status	S.I./ Sem (hrs)	Hours per week and Evaluation type											
				1 <sup>st</sup> Semester 14 weeks						2 <sup>st</sup> Semester 14 weeks					
				C	S	L	Pr	Ev	C	C	S	L	Pr	C	K
<b>COMPULSORY COURSES</b>															
GICF1O01	Mathematic Analysis 1	DF	94	2	2	-	-	Ex	6	-	-	-	-	-	-
GICF1O02	Algebra 1 (Algebraic Structures)	DF	94	2	2	-	-	Ex	6	-	-	-	-	-	-
GICF1O03	Mathematical Logic and Set Theory	DF	69	2	2	-	-	Ex	5	-	-	-	-	-	-
GICF1O04	Algorithms and Programming 1	DF	83	2	-	1	-	Ex	5	-	-	-	-	-	-
GICS1O05	Mathematical Software 1	DS	83	2	-	1	-	Ex	5	-	-	-	-	-	-
GICC1O06	Sports 1	DC	-	-	2	-	-	C	3	-	-	-	-	-	-
GICF2O07	Mathematic Analysis 2	DF	94	-	-	-	-	-	-	2	2	-	-	Ex	6
GICF2O08	Algebra 2 (Linear Algebra)	DF	94	-	-	-	-	-	-	2	2	-	-	Ex	6
GICS2O09	WEB Programming	DS	69	-	-	-	-	-	-	2	-	2	-	Ex	5
GICS2O10	Operating Systems	DS	83	-	-	-	-	-	-	2	-	1	-	Ex	5
GICS2O11	Data Structures	DS	83	-	-	-	-	-	-	2	-	1	-	Ex	5
GICC2O12	Sports 2	DC	-	-	-	-	-	-	-	-	2	-	-	C	3
	<b>TOTAL</b>			<b>10</b>	<b>8</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>27+3</b>	<b>10</b>	<b>6</b>	<b>4</b>	<b>-</b>	<b>-</b>	<b>27+3</b>
<b>ELECTIVE COURSES</b>															
	Pachet 1														
GICC1A13	English 1	DC	47	-	2	-	-	C	3	-	-	-	-	-	-
GICC1A14	French 1	DC	47	-	2	-	-	C	3	-	-	-	-	-	-
GICC1A15	German 1	DC	47	-	2	-	-	C	3	-	-	-	-	-	-
	Pachet 2														
GICC2A16	English 2	DC	47	-	-	-	-	-	-	-	2	-	-	C	3
GICC2A17	French 2	DC	47	-	-	-	-	-	-	-	2	-	-	C	3
GICC2A18	German 2	DC	47	-	-	-	-	-	-	-	2	-	-	C	3
	<b>TOTAL</b>			<b>2</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>-</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>TOTAL</b>				<b>10</b>	<b>10</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>30+3</b>	<b>10</b>	<b>8</b>	<b>4</b>	<b>-</b>	<b>-</b>	<b>30+3</b>
<b>FACULTATIVE COURSES</b>															
GICC1F19	History of mathematics	DC	22	1	1	-	-	C	2	-	-	-	-	-	-
GICC2F20	Volunteering	DC	47	-	-	-	-	-	-	1	1	-	-	C	3

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Legend: C – Lecture; S – Seminar; L – Laboratory; P – Project; SI – Individual Study; Ev – Evaluation; K – Credits;  
DF - Fundamentals course; DS – Specialty course; DC – Complementary course

**CURRICULUM**  
**Academic year 2025 - 2026**  
**Year II**

Code	Subject	Course status	S.I./ Sem (hrs)	Hours per week and Evaluation type											
				1 <sup>st</sup> Semester 14 weeks						2 <sup>st</sup> Semester 14 weeks					
				C	S	L	Pr	Ev	C	C	S	L	Pr	C	K
<b>COMPULSORY COURSES</b>															
GICF3O01	Geometry	DF	94	2	2	-	-	Ex	6	-	-	-	-	-	-
GICF3O02	Differential Equations 1	DF	94	2	2	-	-	Ex	6	-	-	-	-	-	-
GICF3O03	Real Analysis	DF	69	2	2	-	-	Ex	5	-	-	-	-	-	-
GICS3O04	Computer Networks	DS	69	2	-	2	-	Ex	5	-	-	-	-	-	-
GICS3O05	Databases	DS	69	2	-	2	-	C	5	-	-	-	-	-	-
GICF4O06	Complex Analysis	DF	69	-	-	-	-	-	-	2	2	-	-	Ex	5
GICS4O07	Object Oriented Programming	DS	69	-	-	-	-	-	-	2	-	2	-	Ex	5
GICF4O08	Differential Equations 2 (Equations and with Partial Derivatives)	DF	69	-	-	-	-	-	-	2	2	-	-	Ex	5
GICS4O09	Differential Geometry	DS	69	-	-	-	-	-	-	2	2	-	-	Ex	5
GICS4O10	Specialty Practice	DS	120 hrs (4 week. x 6 hrs x 5 day) taking place after the active conclusion. didactic of the sem. 4											C	2
	<b>TOTAL</b>			<b>10</b>	<b>6</b>	<b>4</b>	<b>-</b>	<b>-</b>	<b>27</b>	<b>8</b>	<b>6</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>22</b>
<b>ELECTIVE COURSES</b>															
	Pachet 1														
GICC3A11	English 3	DC	47	-	2	-	-	C	3	-	-	-	-	-	-
GICC3A12	French 3	DC	47	-	2	-	-	C	3	-	-	-	-	-	-
GICC3A13	German 3	DC	47	-	2	-	-	C	3	-	-	-	-	-	-
	Pachet 2														
GICC4A14	English 4	DC	47	-	-	-	-	-	-	-	2	-	-	C	3
GICC4A15	French 4	DC	47	-	-	-	-	-	-	-	2	-	-	C	3
GICC4A16	German 4	DC	47	-	-	-	-	-	-	-	2	-	-	C	3
	Pachet 3														
GICC4A17	Computer Graphics	DC	69	-	-	-	-	-	-	2	-	2	-	C	5
GICC4A18	Scientific and professional writing and communication	DC	69	-	-	-	-	-	-	2	-	2	-	C	5
	<b>TOTAL</b>			<b>-</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>8</b>
<b>TOTAL</b>				<b>10</b>	<b>8</b>	<b>4</b>	<b>-</b>	<b>-</b>	<b>30</b>	<b>10</b>	<b>8</b>	<b>4</b>	<b>-</b>	<b>-</b>	<b>30</b>
<b>FACULTATIVE COURSES</b>															
GICC3F19	History of Computing Systems	DC	22	1	1	-	-	C	2	-	-	-	-	-	-
GICS4F20	Formal languages and compilers	DS	69	-	-	-	-	-	-	2	-	2	-	Ex	5
GICC4F21	Introduction to entrepreneurship	DC	47	-	-	-	-	-	-	1	1	-	-	C	3

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 DF - Fundamentals course; DS – Specialty course; DC – Complementary course

**CURRICULUM**  
**Academic year 2026- 2027**  
**Year III**

Code	Subject	Course status	S.I./ Sem (hrs)	Hours per week and Evaluation type											
				1 <sup>st</sup> Semester 14 weeks						2 <sup>st</sup> Semester 14 weeks					
				C	S	L	Pr	Ev	K	C	S	L	Pr	Ev	K
<b>COMPULSORY COURSES</b>															
G1CF5001	Probability Theory	DF	69	2	2	-	-	Ex	5	-	-	-	-	-	-
G1CS5002	Numerical Analysis	DS	69	2	2	-	-	Ex	5	-	-	-	-	-	-
G1CS5003	Functional Analysis 1	DS	69	2	2	-	-	Ex	5	-	-	-	-	-	-
G1CS5004	Artificial Intelligence	DS	83	2	-	1	-	Ex	5	-	-	-	-	-	-
GICC6005	Ethics and academic integrity	DC	36	-	-	-	-	-	-	1	-	-	-	C	2
GICF6006	Theoretical Mechanics	DF	94	-	-	-	-	-	-	2	-	2	-	Ex	6
GICS6007	Mathematical Statistics	DS	94	-	-	-	-	-	-	2	-	2	-	Ex	6
G1CS6008	Writing and Editing the Diploma Thesis	DS	66	-	-	-	-	-	-	-	-	6	-	C	6
	<b>TOTAL</b>			<b>8</b>	<b>6</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>20</b>	<b>5</b>	<b>-</b>	<b>10</b>	<b>-</b>	<b>-</b>	<b>20</b>
<b>ELECTIVE COURSES</b>															
	Pachet 1														
G1CC5A09	Algorithmics of graphs	DC	69	2	2	-	-	C	5	-	-	-	-	-	-
G1CC5A10	Operational research	DC	69	2	2	-	-	C	5	-	-	-	-	-	-
	Pachet 2														
G1CS5A11	Optimization Techniques	DS	83	2	-	1	-	C	5	-	-	-	-	-	-
G1CS5A12	Advanced programming methods	DS	83	2	-	1	-	C	5	-	-	-	-	-	-
	Pachet 3														
G1CS6A13	Mathematical Software 2	DS	69	-	-	-	-	-	-	2	-	2	-	C	5
G1CS6A14	Cryptography and Information Security	DS	69	-	-	-	-	-	-	2	-	2	-	C	5
	Pachet 4														
G1CS6A15	Functional Analysis 2	DS	83	-	-	-	-	-	-	2	1	-	-	Ex	5
G1CS6A16	Mathematical modeling	DS	83	-	-	-	-	-	-	2	1	-	-	Ex	5
	<b>TOTAL</b>			<b>4</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>10</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>10</b>
<b>TOTAL</b>				<b>12</b>	<b>8</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>30</b>	<b>9</b>	<b>1</b>	<b>12</b>	<b>-</b>	<b>-</b>	<b>30</b>
<b>FACULTATIVE COURSES</b>															
GICC5F17	Entrepreneurship – economic and financial aspects	DC	47	1	1	-	-	C	3	-	-	-	-	-	-
G1CS6F18	Modeling and simulation	DS	83	-	-	-	-	-	-	2	-	1	-	Ex	5
G1CC6F19	Business Management	DC	47	-	-	-	-	-	-	1	1	-	-	C	3

The student who has accumulated the **186** credits by promoting the three-year bachelor's degree obtains a **Graduate Certificate in Computer Science Mathematics (without a Bachelor's Degree Exam)**.

Activity	Evaluation	Credits
Final exam for the Bachelor's degree	Exam	10

The student who has accumulated the **196** credits by promoting the three years of bachelor studies and the bachelor's examination obtains a **Bachelor's degree in Computer Science Mathematics**.

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